United States Patent

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[54] **HIGH-HUMIDITY COMPARTMENT FOR REFRIGERATORS**
6 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **62/382,** 62/407, 62/408
[51] **Int. Cl.** **F25d 25/02**
[50] **Field of Search** 62/382, 408

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ABSTRACT: A high-humidity compartment, disposed in the bottom of the refrigerator compartment of a combination freezer-refrigerator, employs a drawer surrounded by a spaced sleeve. In order to permit the use of roller-type suspension so that the drawer can slide freely in and out, the sleeve is sealed against the side, back and front walls of the drawer. Into the space therebeneath cold air, whose flow is controlled by a damper, is ducted from the freezer compartment and bathes the bottom wall and the lower portions of the side and backwalls of the drawer, the air exiting from the sleeve to join the air from the refrigerator compartment returning to the freezer compartment.

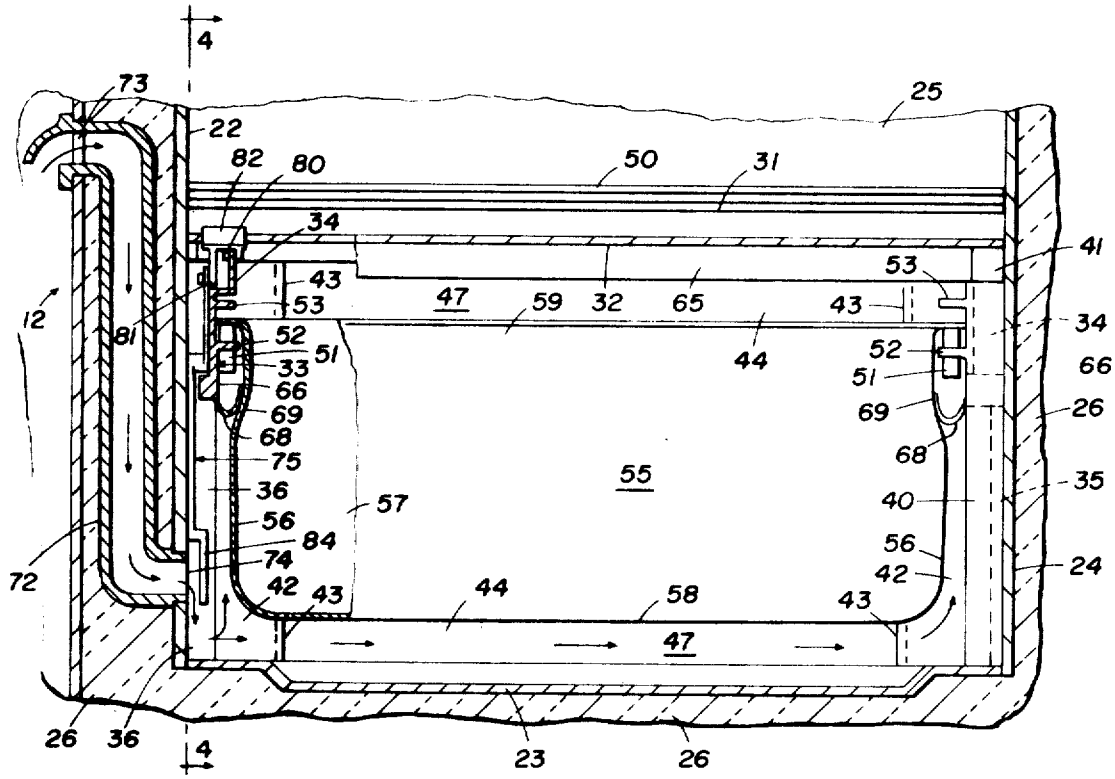
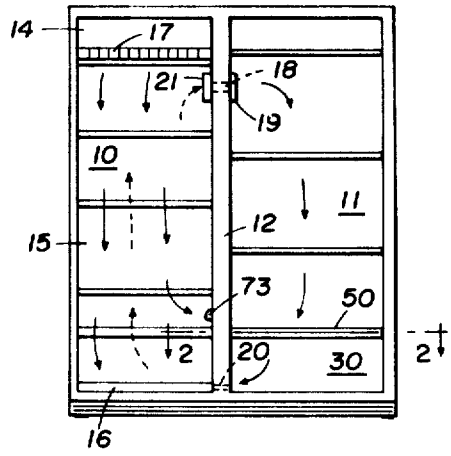


FIG 1



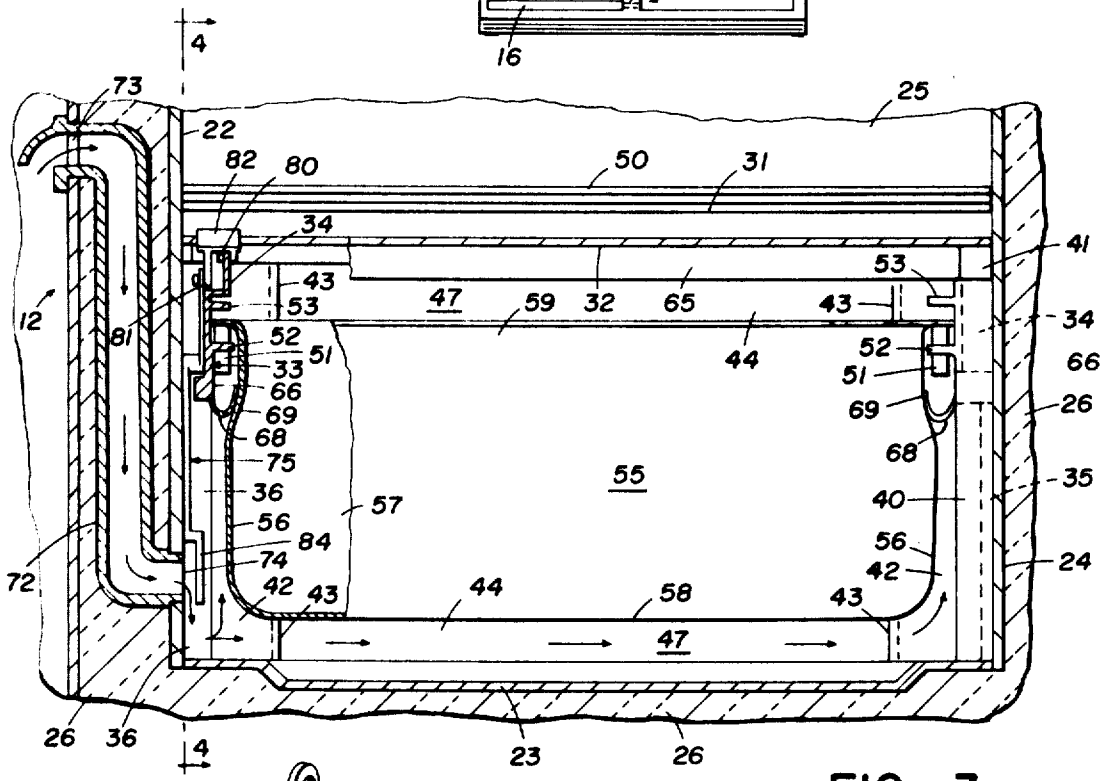


FIG 3

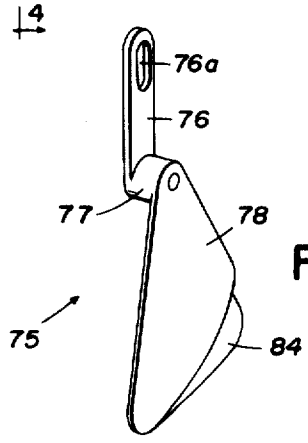


FIG 5

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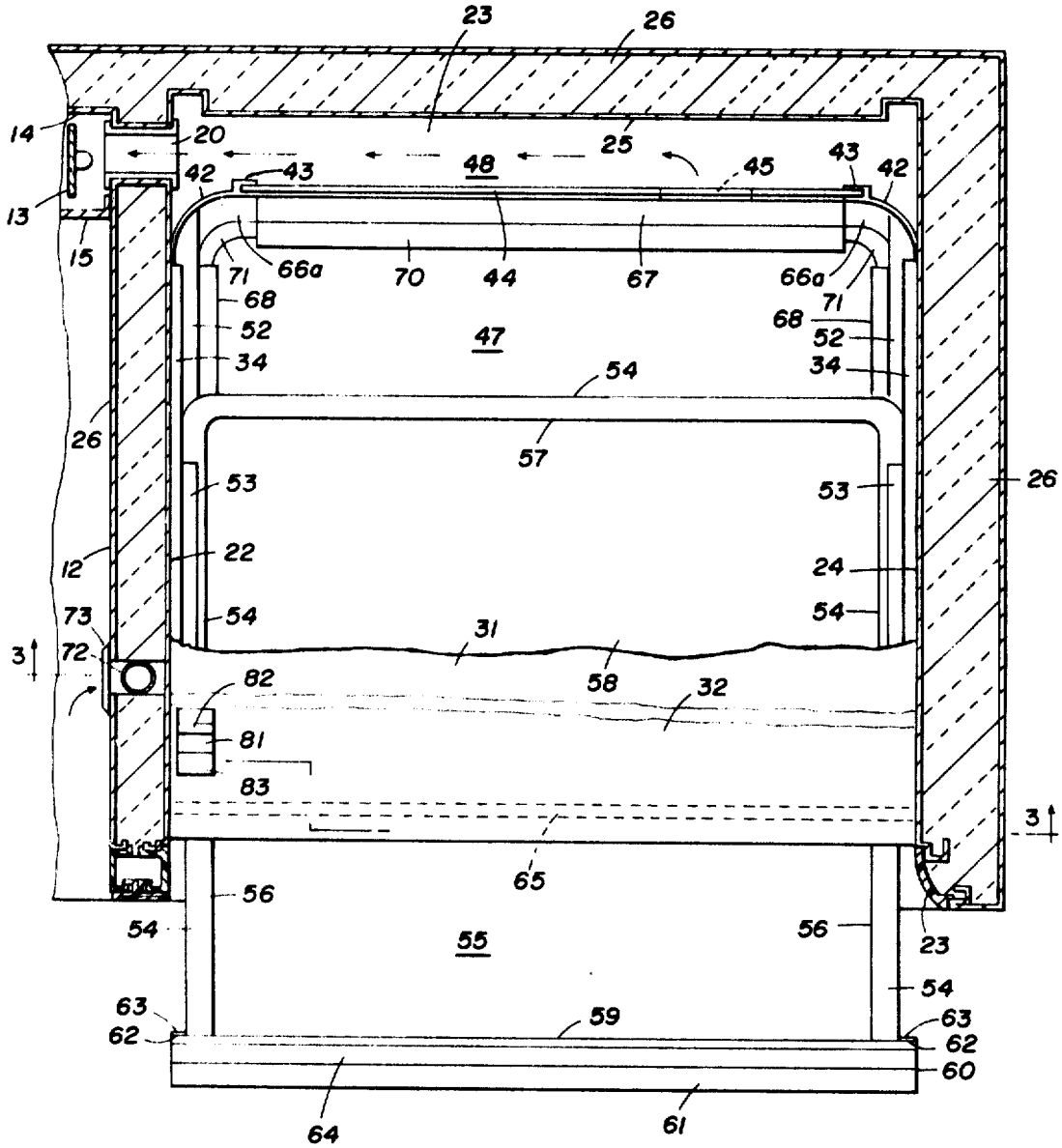


FIG 2

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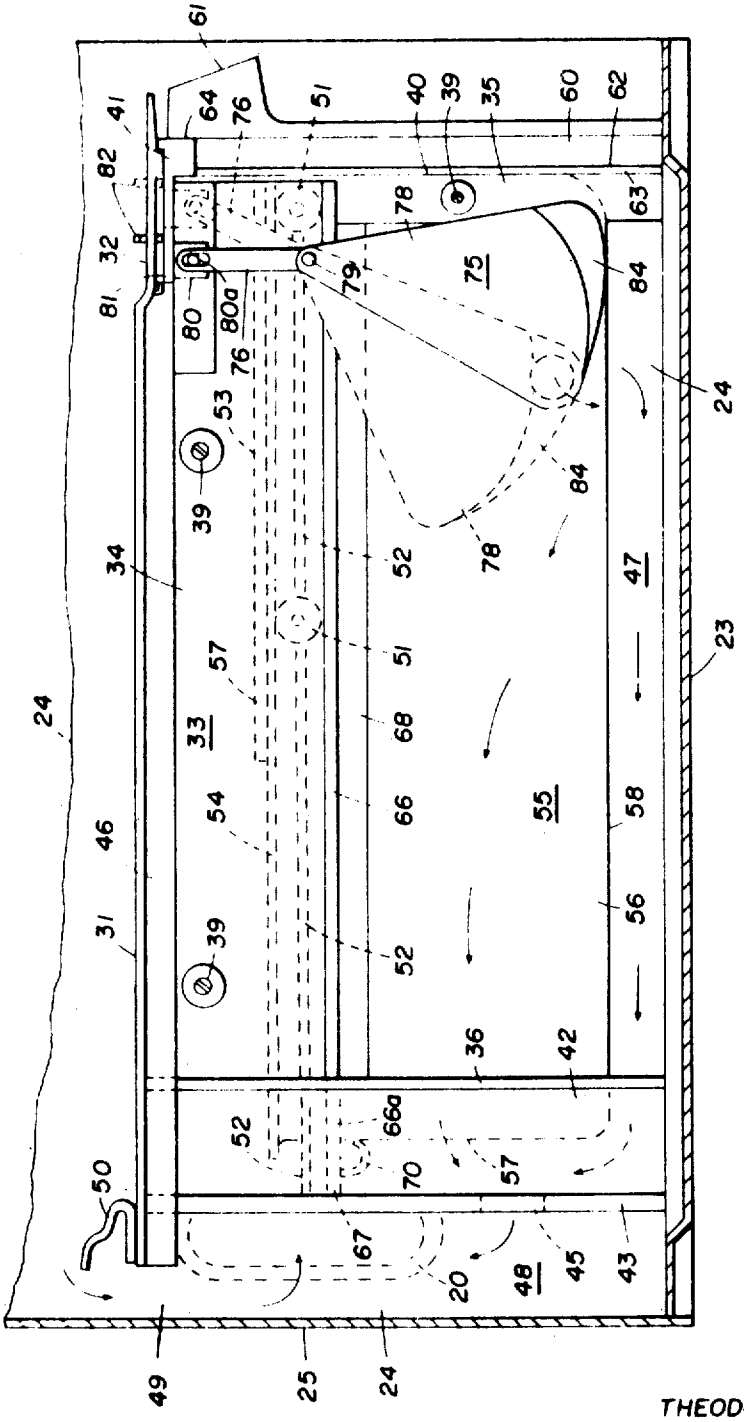


FIG 4

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HIGH-HUMIDITY COMPARTMENT FOR REFRIGERATORS

BACKGROUND OF THE INVENTION

As is well known, it is desirable for the preservation of fresh foods, such as fruit and vegetables, that they be stored at temperatures somewhat below those for the storage of many other foods. When, as is the current practice in combination freezer refrigerators, flowing cold air from the freezer compartment is also used to cool the refrigerator compartment, such air, because of its relative dryness, should not directly contact the fresh foods else they be dried out and lose their freshness. The fresh foods must thus be isolated from the desiccating effect of the colder air so that they may be kept as moist as possible, yet be maintained cool enough to prevent wilting. Sealed compartments, some with doors and some with drawers, have heretofore been used for this purpose; the food is isolated therein from the dry cold air, thus maintaining a relatively high humidity in the compartment, while the walls of the latter are chilled to keep the temperature of the food low. Since high-humidity storage is preferable at the bottom of the refrigerator compartment, so that the housewife must reach down for access to the stored food, a simple door at the front of a high-humidity compartment at that location is not very convenient from the standpoints of both visibility and access to the foods. A sliding drawer is obviously much better in these respects, but it is difficult, without unacceptable costs and complexity, to provide a seal around the top edges of the drawer and at the same time have it freely slide in and out. Equipping the top edges of the drawer sidewalls with lips which slide between closely fitting, vertically spaced guides, will provide a seal but will not, on account of friction and manufacturing tolerances, result in a freely sliding drawer. Hence the chief object of the present invention is to provide a relatively simple, inexpensive high humidity compartment employing a drawer which is freely slidable, yet with its interior effectively sealed off from the cold air surrounding it.

SUMMARY OF THE INVENTION

The drawer forming the high-humidity compartment of the present invention is slidable in and out of a sleeve defined essentially by the side, bottom and rear walls of the refrigerator compartment and a separate top wall. The sleeve spacedly encompasses the side, rear and bottom walls of the drawer, the top side edges of the latter having lips by which the drawer is suspended on friction-free rollers for easy movement. Subfreezing air is ducted into the sleeve and flows about the exposed walls of the drawer. In order to seal the interior of the latter from the sleeve, a horizontal gasket is provided along the side and rear walls of the sleeve somewhat below the level of the rollers, the side portions of the gasket slidably contacting the sidewalls of the drawer while the rear wall of the latter abuts the rear portion of the gasket. A frontpiece on the drawer is sealed against the front face of the sleeve, whence none of the cold air can find its way into the interior of the drawer. At the same time, the top wall of the sleeve seals the interior of the drawer from contact with the air in the refrigerator compartment and the construction of the sleeve is such that it may be removed piece by piece for cleaning.

In the particular embodiment shown and described hereinafter in detail, the high-humidity compartment is incorporated into a typical freezer refrigerator of the "side-by-side" type, wherein the freezer and refrigerator compartments are separated by a vertical partition wall and a single, isolated evaporator in the freezer compartment cools both compartments by means of a system of forced air circulation and ducts. The high-humidity compartment is located in the bottom of the refrigerator compartment and cold air is ducted directly from the freezer compartment through the partition wall and into the sleeve about the drawer, the quantity of air being manually adjusted by means of a damper. The air is

discharged from the sleeve adjacent the return air duct from the refrigerator to the freezer compartment. Thus, the forced air circulation through the refrigerator compartment during the on-cycle produces a measure of forced air circulation through the sleeve. During the off-cycle, gravitational movement of the cold air somewhat accomplishes the same thing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of a typical freezer refrigerator of the "side-by-side" type, the doors not being shown, embodying a high-humidity compartment according to the present invention.

FIG. 2 is a horizontal sectional view along the line 2—2 of FIG. 1, certain portions being further broken away for clarity, showing the high-humidity compartment with its drawer partially open.

FIG. 3 is a horizontal sectional view along the line 3—3 of FIG. 2, the drawer being shown in its fully closed position.

FIG. 4 is a vertical sectional view taken along the line 4—4 of FIG. 3, and illustrating the control damper in its two extreme settings.

FIG. 5 is an isometric view of the control damper itself.

DESCRIPTION OF A PREFERRED EMBODIMENT

As mentioned, the high-humidity compartment is shown incorporated into a "side-by-side"-type of freezer refrigerator having a left-hand freezer compartment **10** and a right-hand refrigerator compartment **11** separated by a vertical partition wall **12**. The single, fin coil evaporator **13**, which cools both compartments **10** and **11**, is vertically disposed adjacent the bottom of the rear wall **14** of the freezer compartment **10** behind a panel **15** which terminates above the floor of compartment **10** to form an air inlet **16**, and short of the roof of compartment **10** to provide an air outlet **17**. A suitable fan (not shown) provides air circulation over the evaporator **13** in the manner shown in FIG. **1**. A lateral duct **18** through the partition wall **12** behind the panel **15** carries some of the chilled air through a thermocontrolled damper assembly **19** into the refrigerator compartment **11**, whence it flows downwardly and is returned to the evaporator **13** by another lateral duct **20** through the partition wall **12** at the bottom of refrigerator compartment **11** rearward of the panel **15**. A suitable thermostatic control **21** governs operation of the refrigerant system (not shown).

As is typical, the refrigerator compartment **11** is formed by a liner providing the refrigerant compartment inner sidewall **22**, its bottom wall **23** which is centrally dished, its outer sidewall **24** and rear wall **25**, all bonded to foamed insulation **26**. The high-humidity compartment, generally designated at **30**, comprises a horizontal top wall **31**, having a scalloped front edge **32**, molded of suitable plastic and disposed between and abutting the compartment sidewalls **22** and **24** in spaced relation to the compartment bottom wall **23**. The top wall **31**, which also forms a shelf, is supported by a pair of drawer carriers **33** along the respective compartment sidewalls **22** and **24**. The drawer carriers **33**, which are substantially mirror images of each other, consist of integral plastic moldings having fore and aft extending side rails **34** terminating forward of the compartment rear wall **25** and supported on fore-and-aft legs **35** and **36** which sit upon the compartment bottom wall **23**, the rails **34** being removably secured to the compartment sidewalls **22** and **24** by integrally molded pins **39**. The front pair of legs **35** are provided with transverse sealing faces **40**, the uppermost portions of which are cantilevered forwardly to form drawer stops **41**. The rear pair of legs **36** are provided with arcuate rear corner walls **42** which terminate in opposed, vertically slotted edges **43**, the latter receiving therebetween a removable rear panel **44** disposed somewhat forwardly of the return air duct **20** and provided with an air outlet **45** adjacent the compartment sidewall **24**. The top wall **31** fits on and is removably interlocked, in any appropriate manner at **46**, with the side rails **34**,

the rear corner walls 42 and the panel 44, thus forming an open front drawer sleeve 47 and, behind panel 44, a return air chamber 48. By removing the top wall 31, the rear panel 44 and then the drawer carriers 33 can be removed piece by piece for cleaning. In order to provide access to the return air duct 20 from refrigerator compartment 11, the top wall 31 is terminated forward of the compartment rear wall 25 to provide an air inlet 49 to chamber 48, the inlet 49 being surmounted by a decorative flange 50 secured along the rear edge of top wall 31.

The inner face of each side rail 34 is provided with a pair of horizontally journaled drawer rollers 51 disposed at fore-and-aft spaced interruptions in a guide rib 52, integral with its respective rail 34, extending from the front leg 35 to the rear corner wall 42. A drawer retaining rib 53, also integral with its respective rail 34, is spaced above the rollers 51 along the forward portion only of each rail 34. The rollers 51 and the ribs 53 receive therebetween the sides of a lip 54 about the top edge of a stamped metal food drawer 55, spaced above the liner bottom wall 23, having sidewalls 56, a rear wall 57, a bottom wall 58 and a front wall 59, the rear corners being rounded concentric with the rear corner walls 42. The drawer front wall 59 is provided with a frontpiece 60, having a handle 61, which extends down to the liner bottom wall 23 and laterally to the compartment sidewalls 22 and 24. The exposed, lateral rear faces 62 of the frontpiece 60 are fitted with suitable gaskets 63 which abut the sealing faces 40 on the front legs 35 of the drawer carriers, and the upper edge of the frontpiece 60 is inwardly stepped at 64 to engage the drawer stops 41 and the forward face of a transverse rib 65 along the scalloped front edge 32 of the top wall 31. Just below the drawer rollers 51, the face of each rail 34 opposite its respective compartment sidewall 22 and 24 is provided with an integral gasket mounting rib 66, while at the same level the other faces of rails 34 along their rear corner walls 42 are provided with similar integral ribs 66*a*, the latter in turn abutting a rib 67, like rib 66, but located on the forward face of panel 44. To the ribs 66 are attached the edges of strips of flexible gasket material 68 whose opposite edges slidably engage horizontal depressions 69 in the sidewalls 56 of the drawer 55. A similar gasket 70 attached by its edge to the rib 67 abuts the drawer rear wall 57 while the rounded rear corners of the drawer 55 abut blocks of resilient gasket material 71 adhered to the ribs 66*a*. Accordingly, when the drawer 55 is fully closed, the drawer stops 41, the gaskets 63 and the rib 65, on the one hand, and the gaskets 68, 70 and 71, on the other, effectively seal the interior of drawer 55 from the portion of sleeve 47 lying below the latter three gaskets. The top wall 31, in turn, seals the interior of the drawer 55 from contact with the air in the refrigerator compartment 11, and since the drawer suspension is simple and friction free, the drawer 55 itself may be readily removed. If desired, the side lips 54 of the drawer 55 may be provided with two pairs of upsets (not shown) to engage the rollers 51 when the drawer 55 is in its closed position in order to maintain it in sealing abutment against gaskets 63, 70 and 71.

In the particular illustrated embodiment, chilled air from the freezer compartment 10 is fed to the sleeve 47 below gaskets 68, 70 and 71 through a short plastic duct 72 foamed in place in the partition wall 12 adjacent its forward edge. The duct 72 opens into the freezer compartment 10 at 73 and then leads downwardly, opening through the compartment sidewall 22 at 74. The quantity of air admitted to the sleeve 47 is controlled by a damper, generally designated at 75. The latter is an integral plastic molding having an upper arm 76, a hub 77 and an offset, sector-shaped lower blade 78. The hub is horizontally pivoted on a stub shaft 79 integral with the left-hand side rail 34 adjacent its forward end so that one face of the damper blade 78 is more or less in surface contact with the adjacent face of the compartment sidewall 22 and the inlet 74 therein. The upper end of the arm 76 is slotted at 76*a* and pivotally and slidably engages a pin 80*a* on a tang 80 depending from a slide control 81 slidably mounted for and aft atop the forward end of the side rail 34. The slide 81 is provided with a manual grip 82 which is exposed through a rectangular aperture 83 in the scalloped portion 32 of the top wall 31. Movement of the slide control 81 thus pivots damper 75 about the stub shaft 79. The lower edge of the damper blade 78 is so curved that when the damper 75 is in the position shown in full lines in FIG. 4 and the slide control 81 is in its rearmost position, the damper blade 78 wholly covers the inlet 74, but as the slide control 81 is slid forwardly, the inlet 74 is progressively uncovered until fully opened, whence the damper 75 is in the position shown in broken lines in FIG. 4. Finally, a depending deflector 84, formed integrally upon the lower edge of damper blade 78 and offset therefrom so that it is spaced from the compartment sidewall 22, serves to direct the incoming air downwardly into the space between the bottom walls 23 and 58 of the refrigerator compartment 11 and drawer 55, respectively. The deflector 84 also serves to prevent cold air from impinging directly upon the drawer sidewall 56 and thus causing localized freezing of the contents therein. Hence, the cold air from the freezer compartment 10 can flow around and bathe the major portion of the sidewalls 56 and the rear and bottom walls 57 and 58 of the drawer 55 before exiting through the outlet 45 in the rear panel 44 to join the air from the refrigerator compartment 11 entering the chamber 48 through the inlet 49 on its way through the duct 20 to the freezer compartment 10. Gravity alone achieves some airflow in the aforesaid manner and this is augmented during the on-cycle by the forced airflow from the refrigerator compartment 11 through the chamber 48. At the same time, for the reasons previously explained, the interior of the drawer is sealed from any contact with both the cold air flowing through the sleeve 47 and the air in the refrigerator compartment 11, whence the contents are kept chilled but in a highly humid atmosphere. The temperature in the drawer 55 may, of course, be varied by adjustment of the damper 75 to admit more or less cold air into the sleeve 47.

While the invention has been shown as applied to a "side-by-side"-type of freezer refrigerator, being the best mode known of carrying out the invention, it is also obviously applicable to other forms of two compartment units merely by appropriately revising or relocating the duct 72 and the damper 75. Thus, the invention is not limited to the particular embodiment shown and described herein in detail, and hence the following claims are to be read as encompassing all adaptions and modifications of the invention falling within the spirit and scope thereof.

We claim:

1. In refrigerating apparatus having a freezer compartment and an above freezing refrigerator compartment, said refrigerator compartment having rear, side and bottom walls a high-humidity storage compartment disposed in said refrigerator compartment, said high-humidity compartment including a drawer slidably mounted for horizontal movement from a closed position outwardly to an open position for access thereto, a subfreezing airsleeve surrounding at least the bottom and sidewalls of said drawer in spaced relation thereto, the front of said drawer forming the front wall of and closing said sleeve when said drawer is in its closed position, and an air inlet to and an air outlet from said sleeve communicating with said freezer compartment for circulation of subfreezing air therefrom through said sleeve around at least the side and bottom walls of said drawer, the improvements in combination therewith comprising: means including rollers carried by said sleeve engaging the top edges of said drawer sidewalls and suspending said drawer in said sleeve for friction-free movement between said drawer positions; and gasket means sealing the interior of said drawer from communication with the cold air in said sleeve when said drawer is in its closed position, said gasket means including a pair of laterally flexible gaskets carried by said sleeve and sealingly engaging the sidewalls of said drawer below the top edges thereof, said drawer sidewalls slidably engaging and laterally flexing said gaskets during said drawer movement.

2. The combination of claim 1 wherein said gasket means also includes gaskets abuttingly engaging the rear wall of said drawer, and further gaskets abuttingly engaging the front of said sleeve and the front wall of said drawer, when said drawer is in its closed position.

3. The combination of claim 2 including damper means disposed within said sleeve adjacent said sleeve air inlet for manually adjusting the quantity of air from said freezer compartment circulated through said sleeve.

4. The combination of claim 1 wherein the bottom and sidewalls of said refrigerator compartment form respectively the bottom and sidewalls of said sleeve, and said refrigerator and freezer compartments are laterally disposed with respect to each other on the sides of a partition wall therebetween, said partition wall adjacent the lower rear corner thereof having a return air duct communicating with said freezer and

refrigerator compartments, and wherein said sleeve includes a backwall forwardly of said return air duct, said sleeve air outlet being disposed in said backwall remote from said partition wall and said sleeve air inlet being disposed in said partition wall adjacent its forward edge.

5. The combination of claim 4 wherein said gasket means also includes gaskets carried by said backwall and said drawer front abuttingly engaging said sleeve backwall and the front of said sleeve, respectively, when said drawer is in its closed position.

6. The combination of claim 5 wherein said sleeve includes a manually adjustable damper therewithin adjacent said sleeve air inlet and pivotally mounted to progressively increase or decrease the quantity of cold air admitted to said sleeve from said freezer compartment.